[77] Rona RJ, Mosbech J. Validity and repeatability of self-reported occupational and industrial history from patients in EEC countries. *Int J Epidemiol* 1989;**18:**674–79.

[78] Ahrens W. *Retrospective Assessment of Occupational Exposure in Case-Control Studies. Development, Evaluation and Comparison of Different Methods*. (Dissertation Bremen University, 1996). Fortschritte in der Epidemiology. Published in Germany by HE Wichmann HE, Jöckel K-H, Robra BP, 1999.

[79] The European Union on-line. *RAMON, Eurostat's Classification Server.* http://europa.eu.int/comm/eurostat/ramon/. 2002.

[80] US Department of Labor OSaHA. *Standard Industrial Classification Search.* http://www.osha.gov/oshstats/sicser.html. 2002.

International Journal of Epidemiology 2003;**32**:428–429
DOI: 10.1093/ije/dyg087

Commentary: Standardized coding of occupational data in epidemiological studies

Manolis Kogevinas

The evaluation of occupational exposures in epidemiological studies is complex because of the multiple potential exposures in the workplace, the varying determinants of exposure between people, the many jobs people hold in a lifetime, and the different reasons for taking or leaving a job. Mannetje and Kromhout[1] show that beyond these well-recognized difficulties there are several more basic issues that are not adequately dealt with in epidemiological studies, particularly the occupational classifications used, and the coding of this information. Their recommendations on the use of standard classifications (e.g. International Labour Organization [ILO]/International Standard Classification of Occupations [ISCO]), the improvement of coding, and the use of additional databanks, will help provide more reliable and comparable results in epidemiological studies regarding occupation. Pooling of studies evaluating occupational exposures typically requires extensive and very time-consuming re-coding of information on occupation and industry that are partially or even totally incompatible.[2] Furthermore, those of us involved in multicentre studies know that this is a particularly serious problem in those studies, since recording of information and coding varies between centres. Similar concerns in a wider context led to initiatives for the development of core questionnaires to be used in epidemiological studies.[3]

In earlier years, a basic classification by industry or major occupations sufficed to identify occupational risks.[4,5] Despite the serious limitations of exposure assessment methods that use only information on occupation and industry, these methods have helped identify specific risks and should continue being used. Surprisingly, in several situations they may even be the best proxy we have for the evaluation of combined and complex exposures. More powerful methods have been developed both for industry-based and population-based studies, including methods for the collection of more detailed information initially, and also elaborate ways for the evaluation of this information. Collection of occupational information can be done, for example, through computer-assisted interviews, repeated interviews with selected subjects, and use of modular questionnaires.[6,7] Evaluation of the data includes assessment by experts,[7,8] and the use of job exposure matrices based on extensive population-based measurements.[9] The identification of exposures still remains a complex issue, but in studies focusing on occupation the available methods have dramatically improved exposure assessment.

One of the main problems many of us encounter refers to the methods applied in studies that are not principally focusing on occupational exposures and in which the interview time dedicated to the evaluation of these exposures is limited. In these studies a balance has to be found between the need to restrict the questionnaire time or other resources for the evaluation of occupational exposures, and the need to get detailed and valid answers. This balance can be achieved if adequate preparatory work is done and priorities are set regarding the evaluation of specific exposures.

Whatever the aims of each study, one main message to be kept from the paper by Mannetje and Kromhout[1] is that information on occupation and industry is, in most studies, one of the basic variables to be collected, similar to smoking, education, or race. In addition, analyses by occupation and industry remain a main method for the identification of occupational risks. An effort should therefore be made to classify them correctly and in a generalizable way. The issues raised by Mannetje and Kromhout are important and have a fairly easy remedy since they depend mostly on researchers being better informed. Such improvements in study methodology do not cost much and, more importantly, they do not complicate the study design and the time requested from study participants. The guidelines mentioned by Mannetje

Respiratory and Environmental Health Research Unit, Municipal Institute of Medical Research (IMIM), Barcelona, Spain, and Division of Cancer Epidemiology and Genetics, National Cancer Institute, MD, USA.

Correspondence: Prof. Manolis Kogevinas, Respiratory and Environmental Health Research Unit, Municipal Institute of Medical Research (IMIM), 80 Dr. Aiguader Rd, Barcelona 08003, Spain. E-mail: kogevinas@imim.es

and Kromhout[1] are relevant to any type of general population study and the lack of application of standard ways to collect and code occupational information should be considered an omission. The recommendations by Mannetje and Kromhout[1] seem fairly basic, and it may appear that they do not even need a scientific paper to support them. This is unfortunately not so, because we have frequently closed our eyes to this problem.

References

[1] 't Mannetje A, Kromhout H. The use of occupation and industry classifications in general population studies. *Int J Epidemiol* 2003;**32:** 419–28.

[2] Mannetje A, Kogevinas M, Chang-Claude J *et al.* Occupation and bladder cancer in European women. *Cancer Causes Control* 1999;**10:**209–17.

[3] Olsen J. Epidemiology deserves better questionnaires. IEA European Questionnaire Group. *Int J Epidemiol* 1998;**27:**935.

[4] Morris JN, Kagan A, Pattison DC, Gardner MJ. Incidence and prediction of ischaemic heart-disease in London busmen. *Lancet* 1966; **ii:**553–59.

[5] Case RAM, Hosker ME, McDonald DB, Pearson JD. Tumours of the urinary bladder in workmen engaged in the manufacture and use of certain dyestuff intermediates in the British chemical industry. *Br J Ind Med* 1954;**11:**75–104.

[6] Ahrens W, Jockel KH, Brochard P *et al.* Retrospective assessment of asbestos exposure-I. Case-control analysis in a study of lung cancer: efficiency of job-specific questionnaires and job exposure matrices. *Int J Epidemiol* 1993;**22(Suppl.2):**S83–95.

[7] Stewart PA, Stewart WF, Heineman EF, Dosemeci M, Linet M, Inskip PD. A novel approach to data collection in a case-control study of cancer and occupational exposures. *Int J Epidemiol* 1996;**25:**744–52.

[8] Siemiatycki J, Richardson L, Gerin M *et al.* Associations between several sites of cancer and nine organic dusts: results from an hypothesis-generating case-control study in Montreal, 1979–1983. *Am J Epidemiol* 1986;**123:**235–49.

[9] Kauppinen T, Toikkanen J, Pukkala E. From cross-tabulations to multipurpose exposure information systems: a new job-exposure matrix. *Am J Ind Med* 1998;**33:**409–17.